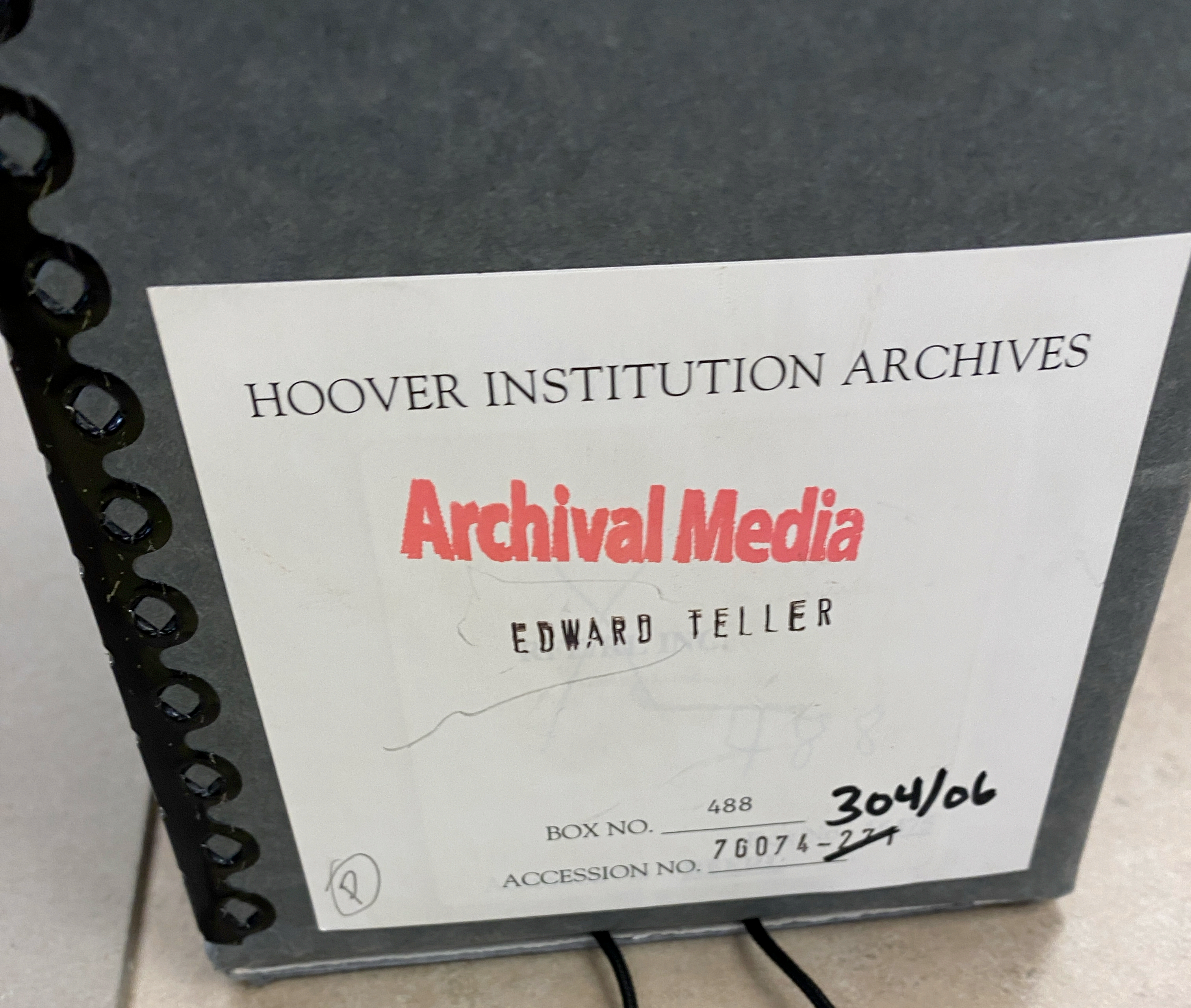

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Archival Media

EDWARD TELLER

BOX NO. 488

ACCESSION NO. 76074-~~271~~ 304/06

②

EDWARD TELLER Nat'l Aeronautics & Space Council, White House 1968-1992

12:41 ☎202 586 9386 DOE S-1 →→→ O DIVISION OFF ☑002

WASHINGTON UPDATE

Policy and Politics in Brief

HOW NASA'S BOSS FELL OUT OF ORBIT

BY DAVID C. MORRISON

[redacted]

SPACE

[redacted]

[redacted]

[redacted]

[redacted]

Departing space agency chief Richard H. Truly
Allies blamed his ouster on a White House cabal.

TELLER

Nat'l Aeronautics & Space Council, White House 1968-1992

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas
77058

NASA

Reply to Attn of: FM2 (86-74)

August 26, 1986

Dr. Edward Teller
Hoover Institute
Stanford, California 94305

Dear Dr. Teller

As per your phone request of August 14, 1986, we are sending you information on the 12-hour (Molniya-type) polar orbits. As you will recall I referred to data I had at hand for an estimate of the apsidal regression (we call it GDOT, for rate of change of G, the argument of perigee) for low polar orbits. I picked off a value of approximately -5°/day but that was for a 200 km circular orbit. I extrapolated to higher orbits and guessed at about -1°/day. As you will see from the data in Table 1, I was still an order of magnitude too large-the rate drops to about -.17°/day for the elliptic orbits (370 x 399998km) you are interested in. Raising perigee and lowering apogee correspondingly can drop the rate to approximately -.07°/day, or, looking at the change in perigee position on a yearly basis, one could reduce the polar reversal (180° shift in apogee/perigee) from about every 3 years to every 6 or 7 years by raising perigee from 370km to 5000km.

I have also enclosed a set of ground tracks on a Mercator World map (of course, latitudes above about 82° cannot be shown) to illustrate the path a satellite in a polar Molniya orbit would trace out. Note that we started (0:00 hrs) at perigee and marked 1 hour time ticks. We were not sure whether you wanted perigee or apogee over the North Pole so we include a set of each. As you will note the time spent over the polar region (>80° Latitude) will be only a few minutes at perigee and about 2 hours at apogee (almost independent of the exact perigee/apogee altitude split).

We trust that this data will suffice for your purposes; however, please feel free to call if you have questions or would like more detail or another case. My phone number is 713-483-4346.

Sincerely,

Ken Young

Kenneth A. Young
Chief, Mission Design Development Branch

Enclosures

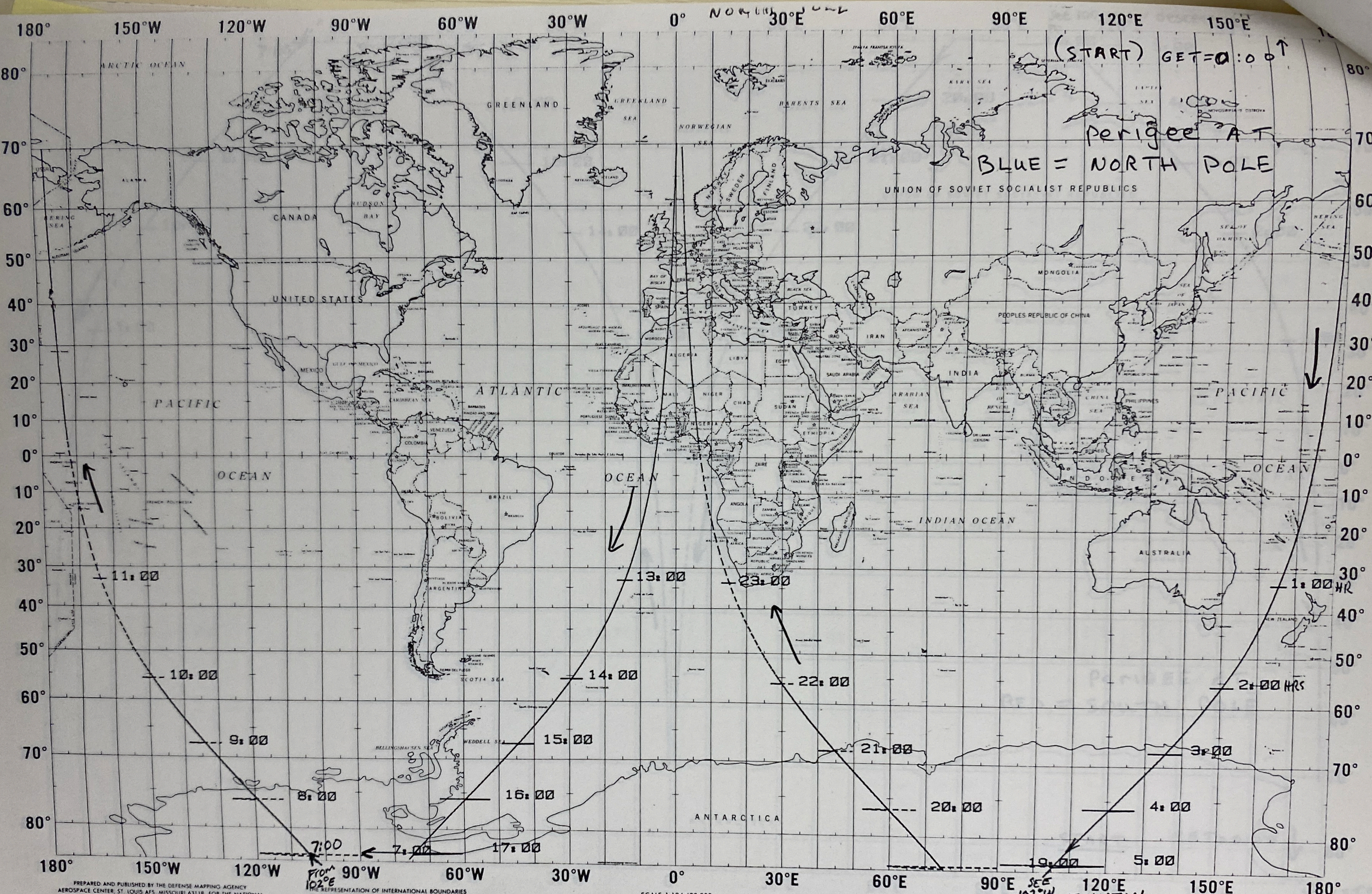
TABLE I: Polar Molniya Orbits

```
INCLINATION
  89.9999                                    One/half Geosynchronous Orbit
                                                  MIN            HOUR
                                 Period        718.0576      11.9676272159
    RE(NM)                       AK(NM)                         AK(FT)
3443.9308855               14342.5269455                    87146850.119
--------------------------------------------------------------------------
Hp(n.mi)                             200      Hp(km)        370.40000018
Ha(n.mi)                     21597.19212      Ha(km)        39997.999826
A(alt)                       10898.59606      A(alt)        20184.199913
ECC                         0.7459352247
Gdot(deg/day)              -0.1717858658
Gdot(deg/yr)                -62.701841009
Hdot(deg/day)              -0.0000005996
--------------------------------------------------------------------------

Hp(n.mi)                            1620      Hp(km)       3000.2400015
Ha(n.mi)                     20177.19212      Ha(km)       37368.159824
A(alt)                       10898.59606      A(alt)       20184.199913
ECC                         0.6469289613
Gdot(deg/day)              -0.0999674632
Gdot(deg/yr)                -36.488124086
Hdot(deg/day)              -0.0000003490
--------------------------------------------------------------------------

Hp(n.mi)                            2700      Hp(km)       5000.4000024
Ha(n.mi)                     19097.19212      Ha(km)       35367.999823
A(alt)                       10898.59606      A(alt)       20184.199913
ECC                          0.571628423
Gdot(deg/day)              -0.0745747064
Gdot(deg/yr)                -27.219767842
Hdot(deg/day)              -0.0000002603
--------------------------------------------------------------------------
```

Gdot= Rate of change of argument of perigee
Hdot= Rate of change of longitude node
Ha/Hp are heights above an equatorial radius, RE

Gdot =sqrt(XMU/AK^3)*(J2*(RE/AK)^2*(1-ECC*ECC)^(-2)*(3-15/4*SIN^2(INC))

XMU = gravitational constant of Earth
AK = semimajar axis
INC = inclination
ECC = eccentricity
J2 = coefficent of second zonal harmonic
RE = equator radius of Earth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80°
ARCTIC OCEAN
GREENLAND
GREENLAND SEA
NORWEGIAN SEA
BARENTS SEA
KARA SEA
UNION OF SOVIET SOCIALIST REPUBLICS
ALASKA
CANADA
HUDSON BAY
UNITED STATES
MEXICO
PACIFIC
OCEAN
ATLANTIC
OCEAN
BRAZIL
ARGENTINA
INDIAN OCEAN
INDIA
IRAN
PEOPLES REPUBLIC OF CHINA
MONGOLIA
AUSTRALIA
NEW ZEALAND
ANTARCTICA
SCOTIA SEA
WEDDELL SEA
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11:00
13:00
14:00
15:00
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17:00
19:00
20:00
21:00
22:00
23:00
From 102°E
SEE 102°W FOR CONTINUATION

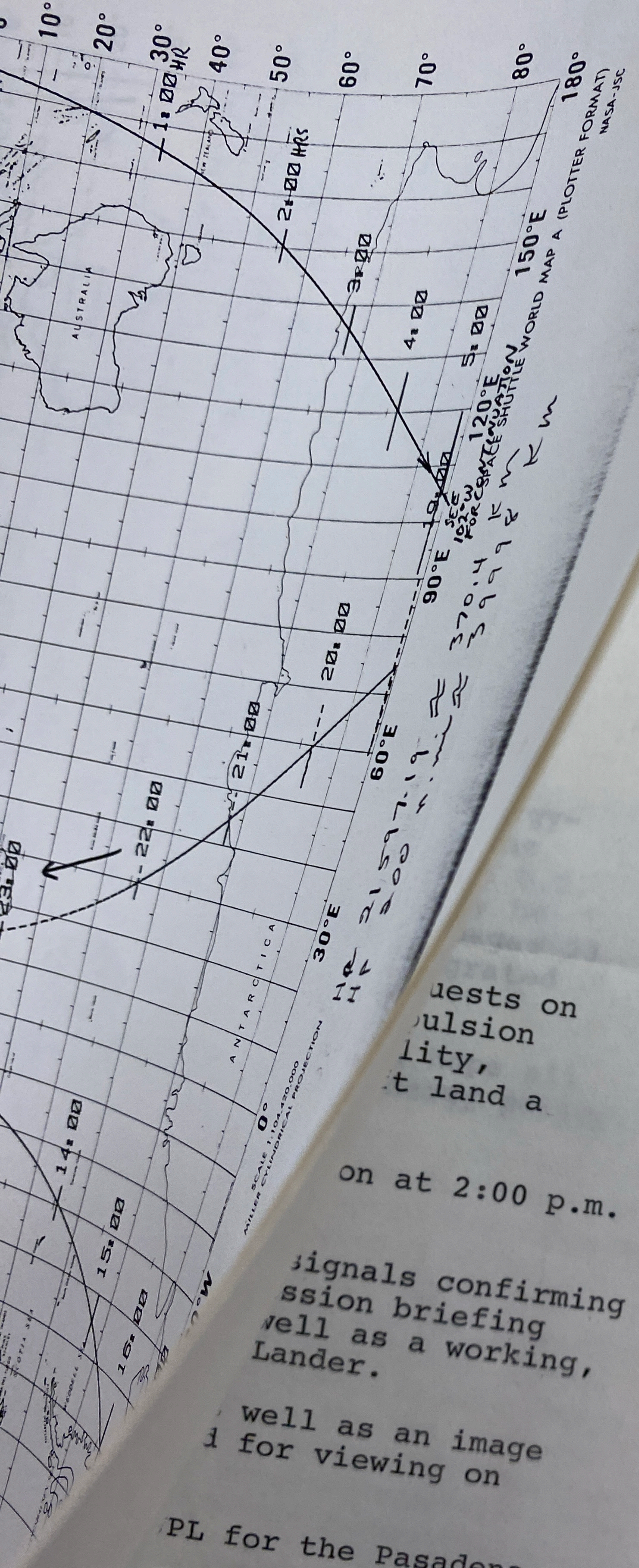
PREPARED AND PUBLISHED BY THE DEFENSE MAPPING AGENCY
AEROSPACE CENTER, ST. LOUIS AFS, MISSOURI 63118 FOR THE NATIONAL
AERONAUTICS AND SPACE ADMINISTRATION.
1ST EDITION MARCH 1974

THE REPRESENTATION OF INTERNATIONAL BOUNDARIES
ON THIS CHART IS NOT NECESSARILY AUTHORITATIVE.

SCALE 1:104,420,000
MILLER CYLINDRICAL PROJECTION

SPACE SHUTTLE WORLD MAP A (PLOTTER FORMAT)
NASA-JSC

Ha 21597.19 ≈ 370.4 Km
Hp 200 n.mi ≈ 39998 Km


1:00 HR
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SPACE SHUTTLE WORLD MAP A (PLOTTER FORMAT)
NASA-JSC
SCALE 1:104,420,000
MILLER CYLINDRICAL PROJECTION

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signals confirming
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Lander.

well as an image
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PL for the Pasadena

I hope you can be there.
Guest Services Desk at

EDWARD TELLER

Nat'l Aeronautics & Space Counci

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

NASA

National Aeronautics and
Space Administration

Washington, D.C.
20546

Office of the Administrator

JUN 2 5 1976

Dr. Edward Teller
Lawrence Livermore Laboratory
University of California
P. O. Box 808
Livermore, CA 94550

Dear Edward:

You are cordially invited to join my special guests on Sunday, July 4, in the Gallery of the Jet Propulsion Laboratory (JPL) Space Flight Operations Facility, 230, in Pasadena when we hope to soft land a for the first time.

wil Pasadena Hilton at 2:00 p.m. rd.

ronic signals confirming n a mission briefing l as well as a working, Mars Lander.

ge as well as an image ceived for viewing on

ing JPL for the Pasadena

g. I hope you can be there. our Guest Services Desk at

MEMORANDUM OF CALL

VISITED BY—

TO SEE YOU

APPOINTMENT

mail.

TIME

332-389 63-108

Surely, Shirley,
these are meant
for LLNL! (S
was OK on line 1,
puzzled on line 2,
and totally lost
on line 3!)

Good luck!

Patty

y invited to join my specia
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ng JPL fo

I hope
our Guest

☐ YOU WERE VISITED BY—

Mrs. Benton

OF (Organization)

☐ PLEASE CALL ⟶ PHONE NO. CODE/EXT.

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

The Viking Landing has been postponed. They will send a mail-a-gram when it is rescheduled i.e. no earlier than July 9—no later than July 21)

RECEIVED BY	DATE	TIME

STANDARD FORM 63
REVISED AUGUST 1967
GSA FPMR (41 CFR) 101-11.6

GPO : 1969—048—16—80341-1 332-389

63-108

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

NASA

National Aeronautics and
Space Administration

Washington, D.C.
20546

Office of the Administrator

JUN 25 1976

Dr. Edward Teller
Lawrence Livermore Laboratory
University of California
P. O. Box 808
Livermore, CA 94550

Dear Edward:

You are cordially invited to join my special guests on Sunday, July 4, in the Gallery of the Jet Propulsion Laboratory (JPL) Space Flight Operations Facility, Building 230, in Pasadena when we hope to soft land a spacecraft on Mars for the first time.

A charter bus will depart the Pasadena Hilton at 2:00 p.m. for JPL. You are welcome to be aboard.

In addition to monitoring the electronic signals confirming the landing, you will participate in a mission briefing and inspect the Viking orbiter model as well as a working, full-size engineering model of the Mars Lander.

If all goes well, a lander pad image as well as an image of the Martian horizon will be received for viewing on the Gallery monitors.

Your special bus would be departing JPL for the Pasadena Hilton about 8:30 p.m.

It should be an exciting evening. I hope you can be there. If you can join us, please call our Guest Services Desk at 213/354-7570.

Sincerely,

Jim F

James C. Fletcher
Administrator

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

REPLY TO
ATTN OF: N

MAY 14 1975

Dr. Edward Teller
Associate Director for Physics
Lawrence Livermore Laboratory
P.O. Box 808
Livermore, CA 94550

Dear Dr. Teller:

Enclosed is a copy of our most recent report on energy-related activities in NASA which was prepared for the Committee on Aeronautical and Space Sciences of the U.S. Senate. Based on our recent conversations, you may be particularly interested in projects described on pages 23 and 66 pertaining to wind energy systems and Integrated Utility Systems (IUS) respectively.

I hope to see you again soon in Washington and I hope all is going well with your activities related to energy policy.

Sincerely,

Jack Schmitt

Harrison H. Schmitt
Assistant Administrator
for Energy Programs

Enclosure a/s

m

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER
MOFFETT FIELD, CALIFORNIA 94035

REPLY TO
ATTN OF: D:200-1

November 27, 1970

Professor Edward Teller
Lawrence Radiation Laboratory
P. O. Box 808
Livermore, California 94550

Dear Edward:

This will be a rather long and disjointed letter because there are several things that I really would like to discuss with you. To begin with, let me thank you for arranging things with the SAB so that I can serve as a consultant to the Board. In my view, we do not have close enough collaboration between NASA and the Air Force and I am hoping that I can help on that front. I am particularly anxious to think about what the Air Force should do in Space in the next few years. As you know, when the Apollo program comes to an end in 1974, NASA will not have any manned space flight activities until the shuttle vehicles become operational sometime around 1980. I think that it is bad for the country not to have the ability to send men into space for six or seven years. My feeling is that the Air Force should do something about this because we (NASA) will not be able to get the support to do it. I have not thought very much about it yet but my first instinct is to propose that the Air Force do something like Gemini but with new objectives. I can think of at least two things that should be done in such a program. The first is that we should develop the ability to bring Gemini like vehicles down on land so that we can recover vehicles within the continental U. S. The second is that we should learn how to make rapid orbital changes and maneuvers. Both of these objectives are well within our present technical capabilities and my feeling is that both will have ultimate military value. Have things of this kind been discussed by the SAB? If not, I think that they should be.

Another matter I would like to discuss with you is the status of ABM. On December 7 and 8 I am going to a meeting at White Sands for a thorough discussion of the technical situation. Starbird plans to be there as well so I have every reason to believe that the meeting will be a valuable one. After the meeting, I would like to sit down with you to discuss what, if anything, we should be doing about ABM at Ames. Incidentally, there are some people in Bill Fairbank's group at Stanford who have some interesting - even if somewhat far out - ideas about the ABM problem. I think that it might be worthwhile for someone to listen to Fairbank - he is a very good man with lots of imagination.

Everyone who participated in the meeting with you and Mike at Ames a few weeks back really enjoyed the experience. I hope very much that you will be able to come again soon and listen to some of the other things we are doing. I am particularly anxious to have you listen to our laser people and to give you a briefing on the current state of military aviation by some of our people. I will be calling Olivette shortly to propose some dates and I hope very much that you'll be able to come.

With best regards.

Sincerely,

Hans

Hans Mark

P. S. I'm enclosing a preprint of a paper we submitted to "Nuclear Physics" a week ago. The paper is based on Gene Canfield's thesis as well as some additions we cooked up.

DEPARTMENT OF DEFENSE
THE NATIONAL WAR COLLEGE
WASHINGTON, D.C. 20315

NWCDI

9 September 1971

Dr. Edward Teller
University of California
Lawrence Radiation Laboratory
Berkeley, California 94720

Dear Dr. Teller:

I want to congratulate you most sincerely on your thought-provoking and stimulating lecture to the students of the National War College on "Science and Technology as Factors of National Power." I deeply regret that another commitment made it impossible for me to hear all of your address and the always challenging question and answer period. The highly favorable comments I have heard from students and faculty alike convince me that your candor and willingness to discuss controversial issues with the students ensured the memory of your visit as one of the high points of the academic year.

We also appreciate that your busy schedule permitted you to examine issues in greater detail in the student seminar, and to remain with us for lunch to appropriately cap our daily study program. Comments reaching me from students attending these two functions were exceptionally complimentary, which simply confirms in our minds the important role you play in the success of our mission.

We hope it will be our pleasure to welcome you back to the National War College to address the Class of 1973, and I want to extend to you my very best wishes for a productive and successful year.

Sincerely,

P W Jackson

for

JOHN B. McPHERSON
Lieutenant General, USAF
Commandant

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

REPLY TO
ATTN OF: RAA

April 30, 1971

Dr. Edward Teller
Associate Director
Lawrence Radiation Laboratory
University of California
P. O. Box 808
Livermore, California 94550

Dear Dr. Teller:

On behalf of Mr. Jackson, I am sending you an agenda for the Laser Briefing to which you have been invited.

The briefing will be classified Secret and we would appreciate it if you would have your Security people send in your clearance to

Mr. L. Bour
Code DHZ
NASA Headquarters
Washington, D. C. 20546

We are looking forward to seeing you at the meeting.

Sincerely,

William S Aiken Jr
for Alfred Gessow, Chief
Aerodynamics and Fluid Mechanics

Enclosure

AGENDA

LASER BRIEFING

May 24, 1971

Room 425
600 Independence Avenue
Washington, D. C.

0830 Opening Remarks - Roy P. Jackson, Associate Administrator for Advanced Research and Technology - NASA

0835 Introduction and Meeting Overview - Professor A. Hertzberg, University of Washington

0900 Laser Technology

1. Gas Dynamic Lasers - Mr. Peter H. Rose, Mathematical Sciences, Northwest, Inc.
2. The Electric Discharge Laser - Dr. Ray E. Kidder, Lawrence Radiation Laboratory
3. Chemical Laser - Dr. Walter R. Warren, Aerospace Corporation
4. Summary - Col. Donald Lamberson, Air Force Weapons Laboratory (AFWL)

1030 Discussion and Coffee

1045 Optics, Pointing and Tracking - Dr. Walter R. Sooy, Naval Research Laboratory

1145 Discussion

1200 Lunch

1300 Atmospheric Effects and Propagation - Dr. Petras Avizonis, AFWL

1330 Discussion

1345 Target Effects - Major John Kurzenberger, AFWL

1415 Discussion and Coffee

1430 Systems Applications

1. Systems Implications of Laser Technology - Mr. Kent Kresa, ARPA
2. Airborne Application A - Col. Jasper Welch, Headquarters, USAF
3. Airborne Application B - Dr. Richard Hundley, Rand Corporation

1530 Discussion and Coffee

1600 Air Force High Energy Laser Program - Col. Donald Lamberson, AFWL

1620 NASA Programs and Discussion

1730 Adjourn

NASA-HQ

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

OFFICE OF THE ADMINISTRATOR

December 9, 1968

Dr. Edward Teller
1573 Hawthorne Terrace
Berkeley, California 94708

Dear Dr. Teller:

Dr. George E. Mueller joins me in inviting you to witness the second manned Apollo launch now scheduled no earlier than 7:51 a.m. EST, December 21, 1968, at the John F. Kennedy Space Center, Florida.

This lunar orbit mission will be man's first flight into deep space beyond earth orbit. Designated Apollo 8, it represents an important step toward the national goal of making a manned lunar landing next year. It will also be the first manned flight of the Saturn V rocket, previously flown on two unmanned Apollo launches. Crewmen for the mission are Frank Borman, Commander; James A. Lovell, Jr., Command Module Pilot; and William A. Anders, Lunar Module Pilot.

Three days prior to the launch date, a NASA Protocol Office will be opened in the Terrace Room of the Quality Courts Motel at Cocoa Beach where you may obtain guest credentials and information. Transportation to carry you from Cocoa Beach to the launch viewing site and return will be provided.

Delays are always possible in a launch of this complexity. In the event of a postponement, the invitation is, of course, extended to the new date. A tour of the facilities at the Kennedy Space Center will be provided in any event.

Beginning December 9, a telephone information service will be in 24-hour operation until the day of the launch to provide details of the launch status, mission preparation and the current launch time. The number is 202/962-2428.

Please find enclosed an information sheet which may be helpful to you.

Sincerely yours,

T Paine

T. O. Paine
Acting Administrator

Enclosure

2

Teller / Batzel

Sept 9-11

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LEWIS RESEARCH CENTER – PLUM BROOK STATION
TAYLOR ROAD AND COLUMBUS AVENUE
SANDUSKY, OHIO 44870

TELEPHONE: 625-1123 TWX: 419-626-6010

IN REPLY REFER TO:

February 4, 1969

Dear Sir:

The National Aeronautics and Space Administration and The Atomic Energy Commission will jointly sponsor a National Symposium on Developments in Irradiation Testing Technology at Lewis Research Center's Plum Brook Station on September 9, 10, and 11, 1969.

The object of this symposium is to present the most recent and significant contributions toward improvement in the state of the art of fissile and non-fissile Irradiation Testing Technology. We intend to cover and stress the unique techniques proven necessary to obtain meaningful experimental data.

I am pleased to personally invite you and members of your staff to participate in this symposium. I feel that each of us will benefit from the others experiences. You will be contacted shortly by the General Chairman regarding the details of this symposium.

Sincerely,

Abe Silverstein

Abe Silverstein
Director

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

REPLY TO
ATTN OF: SG(ERS:ml)

24 OCT 1969

Dr. Edward Teller
Lawrence Radiation Laboratory
University of California
Berkeley, California 94720

Dear Dr. Teller:

I am writing in reply to your telegram of October 15, 1969 to Dr. Paine, in which you requested additional ephemeris data for OSO-IV in order to make it possible to analyze observations made by Dr. Waggoner.

Severe budgetary problems have made it necessary to curtail, drastically, operations and data processing from satellites in the Physics and Astronomy Program. We do, however, undertake to give first priority to the operations and data processing needed to fulfill the objectives of the missions. In the case of OSO-IV, we will continue data processing, as a top priority item, for the first year of operation. This definitely includes the provision of ephemeris data (including attitude information) for the first year of operation. I believe that this will fulfill your requirements as stated in the above telegram.

Sincerely yours,

John E. Naugle

John E. Naugle
Associate Administrator for
Space Science and Applications

cc: Dr. James Waggoner, Univ. of Calif.

Invitatio

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER

INSTITUTE FOR SPACE STUDIES
NEW YORK, N. Y.

MAIL ADDRESS
INSTITUTE FOR SPACE STUDIES
2880 BROADWAY
NEW YORK, N. Y. 10025

TELEPHONE
UNIVERSITY 6-3600

May 14, 1970

Professor Edward Teller
Department of Physics
University of California
Berkeley, California 94720

Dear Professor Teller:

We are very pleased to announce that the THIRD "CAMBRIDGE" CONFERENCE ON RELATIVITY has been rescheduled for Monday, June 8, 1970, beginning at 10:00 A.M. at the Institute for Space Studies.

We hope you will be able to attend; a reply card is enclosed for your convenience. There appears to be tremendous enthusiasm about the conference and it promises to be a most exciting day.

Sincerely yours,

Jack Jaffe
Jack Jaffe

Hong-Yee Chiu

JJ:HYC:mn

COMMITTEE ON SCIENCE AND ASTRONAUTICS
HOUSE OF REPRESENTATIVES
WASHINGTON, D. C.

MEMORANDUM for AERO-SPACE INDUSTRY

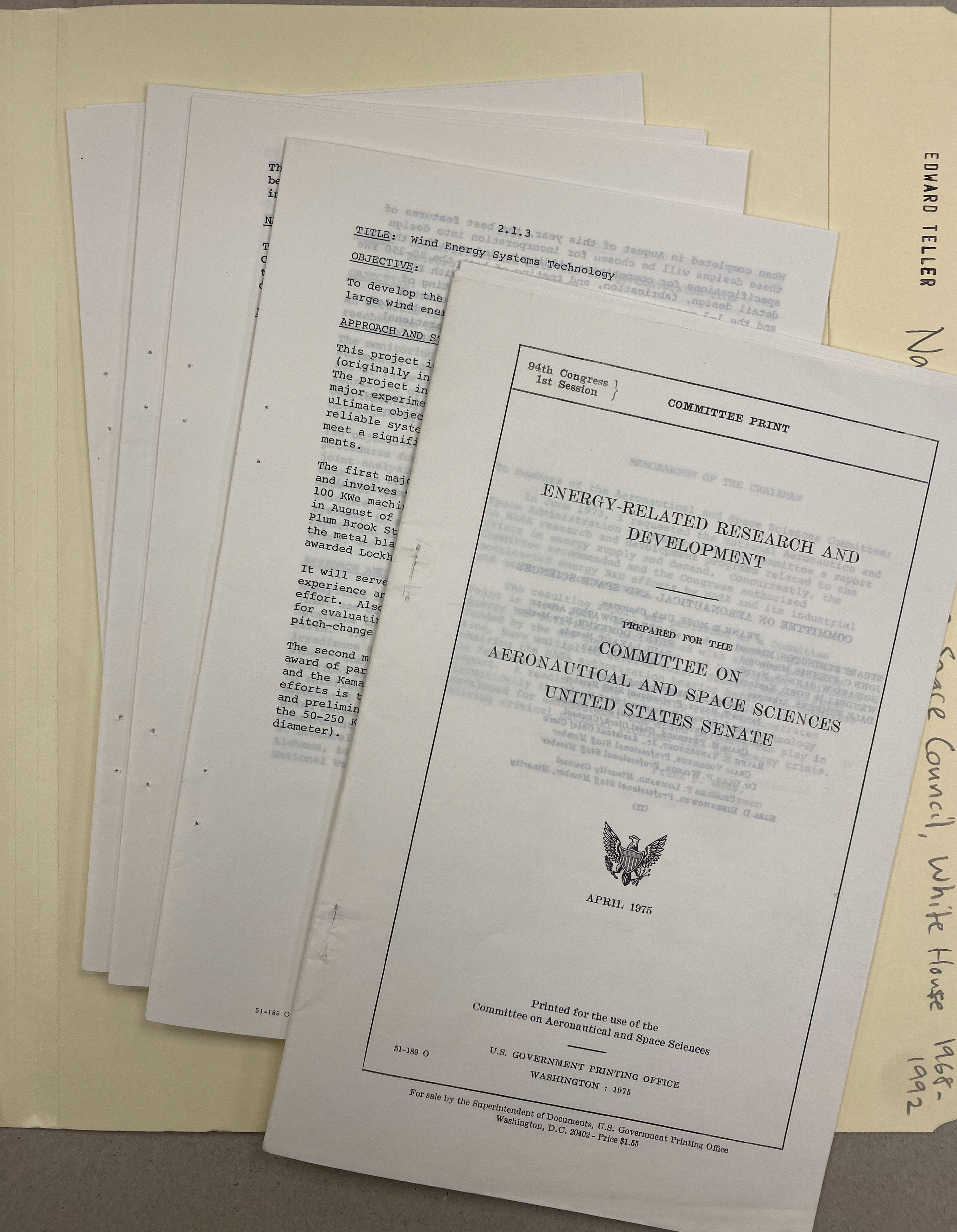
September 16, 1969

Many of you, particularly those located at or near the NASA field centers, participated in providing basic information for this report. In the course of the survey I visited 12 "on-site" contractors plants from California to Florida.

Cost data on the engineering management of facility development by on-site contractors and/or by architect-engineer contractors are included in the tables for JPL, NRDS, MSC, Marshall, Michoud and MTF. Certain related observations are stated in the chapter on Analysis (page 47) and in the Conclusions (page 51).

It is hoped that these data on the various methods and relative costs of supervising the design and construction of the sophisticated NASA plant will be useful. Your cooperation is appreciated.

Philip P. Dickinson
Technical Consultant



EDWARD TELLER

Na… Space Council, White House 1968-1992

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TITLE: Wind Energy Systems Technology

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94th Congress }
1st Session }

COMMITTEE PRINT

ENERGY-RELATED RESEARCH AND DEVELOPMENT

PREPARED FOR THE

COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES UNITED STATES SENATE

APRIL 1975

Printed for the use of the
Committee on Aeronautical and Space Sciences

51-189 O

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1975

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $1.55

IMG_2121

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CHARLES F. LOMBARD, *Minority Counsel*
EARL D. EISENHOWER, *Professional Staff Member, Minority*

MEMORANDUM OF THE CHAIRMAN

To Members of the Aeronautical and Space Sciences Committee:

In June 1973, I requested the National Aeronautics and Space Administration to prepare for the Committee a report on NASA research and development programs related to the crisis in energy supply and demand. Concurrently, the Committee recommended and the Congress authorized accelerated energy R&D efforts by NASA and its industrial and university contractors.

The resulting report was published as a Committee Print in March 1974. From these modest beginnings, NASA's energy R&D activities, coordinated with and now partially funded by the new Energy Research and Development Administration, have multiplied several fold. Senator Wendell Ford, chairing the NASA authorization hearing before the Committee on February 6, 1975, requested that NASA update the 1974 report. A reading of the following report demonstrates dramatically the major role that wise use of technology developed for aeronautical and space purposes can play in solving critical national problems like the energy crisis.

Frank E. Moss,
Chairman

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ENERGY-RELATED RESEARCH AND DEVELOPMENT

Prepared by the

Office of Energy Programs
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2.1.3
TITLE: Wind

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for additional investigations in these areas is

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TITLE: Wind Energy Systems Technology

OBJECTIVE:

To develop the technology and demonstrate cost-competitive large wind energy systems.

APPROACH AND STATUS:

This project is in support of the ERDA Wind Energy Program (originally initiated under a NSF/NASA agreement in FY 1975). The project involves the design, fabrication, and testing of major experimental wind energy conversion systems with the ultimate objective of demonstrating that cost-competitive and reliable systems can be used on a commercial basis to help meet a significant portion of the Nation's energy requirements.

The first major task in this project was started last year and involves the design, construction, and testing of a 100 KWe machine which is scheduled for initial operation in August of this year at the NASA Lewis Research Center in Plum Brook Station, near Sandusky, Ohio. A contract for the metal blades for a 100 KWe wind energy system has been awarded Lockheed Aircraft Company of Burbank, California.

It will serve as a research tool for obtaining early operational experience and performance data to help guide the technology effort. Also, the machine will serve as a critical test bed for evaluating new technology developments, such as blades, pitch-change controls, and generators.

The second major task was initiated in November 1974, by the award of parallel contracts to the General Electric Corporation and the Kaman Aerospace Corporation. The purpose of these efforts is to perform conceptual design studies and analyses, and preliminary design of second generation machines in both the 50-250 KWe and 1-3 megawatt sizes (up to 300 feet in diameter).

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The need for additional investigations in these areas is being discussed with DOT's Transportation Systems Center in Massachusetts.

NASA CENTER AND RELATED WORK:

This work is being conducted by the NASA Flight Research Center and the Jet Propulsion Laboratory. The basic technology and instrumentation techniques used in the project derive from the aeronautics flight test program.

FY 1975 RESOURCES:

R&D Funding: $40K (Reimbursable)

NASA Direct Man Years: 6

OBJECTIVE:

major significance of the research conducted in MHD
potential to provide new capabilities
generation and

2.5 ENERGY RESOURCES EXTRACTION

NASA has undertaken activities in two energy resource extraction fields, geothermal energy and underground coal extraction.

Geothermal energy is one of several important energy sources that may provide much of our future energy supply. Although the technology for the use of natural hot, dry steam is well established, the problems of extracting energy from other geothermal energy sources appear to require a major National effort.

The most important potential new geothermal energy sources are: hot, dry rock masses; hot, geo-pressured trapped water; high-temperature water systems; and low-temperature water systems. All of these sources are contaminated to varying degrees by corrosive mineral salts. Each source will require new technologies if its full potential is to be realized. These technologies span the following areas:

- Resource inventory and assessment
- Exploration and development of the energy source
- Energy extraction
- Energy conversion
- By-product extraction
- Waste disposal

Our work in underground coal energy extraction was initiated at the request of the Secretary of the Interior. NASA has been assessing the potential contributions which could be made to the efficient, safe and environmentally compatible extraction of the much-needed energy contained in coal.

At first it might appear that there is little relationship between the aeronautics and space technologies and the complex and critical problems associated with underground coal mining. However, a large number of technology areas have possible application for advancing the technology used in coal extraction which need to be assessed.

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TITLE: Magnetohydrodynamic Power Generation

OBJECTIVE:

The major significance of the research conducted in MHD Energy Systems is its potential to provide new capabilities for missions in aeronautics and space. Generation and utilization of energy in the plasma state affords prospects for innovation in power generation and space propulsion. MHD-generators in the high-power range may provide lightweight power systems suitable for military aeronautical and space applications. In addition, these generators may also contribute to producing low-cost electrical power for terrestrial needs from natural and artificial fuels.

APPROACH AND STATUS:

Research on MHD energy conversion in NASA is conducted entirely at the NASA Lewis Research Center. The world's largest closed-loop MHD experiment has been designed, built, and operated at conditions that might be achieved with high-temperature nuclear reactors expected as an outgrowth of nuclear rocket technology. To date, the closed-loop MHD generator has operated at temperatures above 2000°K for many hours and provided a fund of basic data on generator performance. A new combustion-driven MHD experiment has been started using existing magnet and rocket facilities. A combustor is being developed for stoichimetric burning of hydrogen and oxygen, and a means to seed the hot gases with cesium hydroxide to increase electrical conductivity is being provided. This experiment will use strong magnetic fields produced by a neon-cooled, cryogenic magnet in order to achieve a high power density (100 w/cm^3).

The purpose of this project is to establish the knowledge required to utilize MHD generators for advanced electrical power systems of potential importance to the aerospace role of NASA, and to understand the fundamental physical processes involved in these plasmadynamic energy systems. In order to accomplish this, the following targets have been set:

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